CLAIMS

1. A system for attenuation of acoustic waves traveling through a longitudinal member capable of transmitting said acoustic waves therethrough comprising:

a plurality of spaced-apart masses firmly attached to an adjacent outer wall of said longitudinal member, each said plurality of masses having a predetermined spacing and a predetermined magnitude for attenuation of acoustic pulses in a predetermined frequency range.

2. The system for attenuation of acoustic waves according to claim 1 wherein said predetermined frequency range comprises 10 khz to 20 khz.

3. The system for attenuation of acoustic waves according to claim 2 wherein said plurality of masses comprises a material selected from (i) steel rings, and, (ii) tungsten rings.

4. The system for attenuation of acoustic waves according to claim 3 wherein said plurality of masses is between six and ten.

5. The system according to claim 1 wherein said spacing of the masses is within the range of twelve to fourteen centimeters.

6. The system according to claim 1 wherein the masses comprise metal rings

attached to the outer wall of the longitudinal member by neck pieces extending inward from an inner circumference of the rings.

7. The system according to claim 1 wherein each of said plurality of masses is attached to the longitudinal member by at least one neck piece.

8. The system according to claim 1 wherein the masses comprise metal rings attached to a shoulder on the longitudinal member.

9. The system according to claim 8 wherein the metal rings are asymmetrically attached to the shoulder on the longitudinal member.

10. An apparatus for performing acoustic investigations of a subsurface geological formation penetrated by a borehole comprising:

(a) a longitudinally extending body conveyed in said borehole;

(b) an acoustic transmitter supported by the body, said transmitter generating acoustic signals in the body, the borehole and the subsurface formations;

(c) an acoustic receiver spaced apart from the transmitter and supported by the body for receiving said acoustic signals; and

(d) an attenuator located on a substantially cylindrical portion of the body having an inner diameter and an outer diameter, between said acoustic transmitter and said acoustic receiver for attenuating said acoustic signals in the body within a predetermined frequency range;

US 3493921

wherein said attenuator comprises a plurality of spaced-apart masses having a predetermined spacing, mass and length firmly attached to an outer wall of the cylindrical portion of the body.

11. The apparatus of claim 10 wherein the longitudinally extending body is conveyed on a drilling tubular having a drillbit therein for drilling the borehole, said drilling tubular selected from the group consisting of (i) a drillstring, and, (ii) coiled tubing.

12. The apparatus of claim 10 wherein the attenuator comprises a plurality of spaced apart masses wherein said predetermined frequency range comprises 10 khz to 20 khz.

13. The apparatus of claim 10 wherein the attenuator comprises a plurality of spaced apart masses wherein material of said masses is selected from the group consisting of (i) steel rings, and, (ii) tungsten rings.

14. The apparatus of claim 10 wherein the attenuator comprises a plurality of spaced apart masses wherein said plurality of masses is between six and ten.

15. The apparatus of claim 10 wherein the attenuator comprises a plurality of spaced apart masses and wherein said spacing of the masses is within the range of twelve to fourteen centimeters.

16. A method of performing acoustic investigations of a subsurface geological

formation penetrated by a borehole comprising:

(a) conveying a logging tool having a substantially cylindrical body into the borehole;

(b) activating a transmitter on the body for generating acoustic signals in the formation, borehole and the body;

(c) attenuating signals passing through the body using an attenuator comprising a plurality of spaced-apart masses firmly attached on an outside adjacent wall of the body, said masses being spaced apart a preselected distance to attenuate signals within a specified frequency range;

(d) using a receiver on a side of the attenuator opposite the transmitter for receiving signals through the formation and the attenuated signals through the body.

17. The method of claim 16 wherein said specified frequency range comprises 10 khz to 20 khz.

18. The method of claim 16 wherein said plurality of masses comprises a material selected from (i) steel rings, and, (ii) tungsten rings.

19. The method of claim 16 further comprising conveying the logging tool on a drilling tubular.

20. The method of claim 16 further comprising performing said acoustic investigations during drilling of the wellbore.

21. A system for attenuation of acoustic waves traveling through a longitudinal member capable of transmitting said acoustic waves therethrough, comprising a plurality of spaced-apart masses firmly and asymmetrically attached to an adjacent outer wall of said longitudinal member, each said plurality of masses having a predetermined spacing and a predetermined magnitude for attenuation of acoustic pulses in a predetermined frequency range.

22. The system according to claim 21 wherein the plurality of masses comprises a material selected from (i) steel rings, and (ii) tungsten rings.

23. The system according to claim 21 wherein the predetermined frequency range comprises 10khz to 20 khz.

24. The system for attenuation of acoustic waves according to claim 21 wherein said plurality of masses is between six and ten.

25. The system according to claim 21 wherein said spacing of the masses is within the range of twelve to fourteen centimeters.

26. A method of performing acoustic investigations of a subsurface geological

formation penetrated by a borehole comprising:

(a) conveying a logging tool having a substantially cylindrical body into the borehole;

(b) activating a transmitter on the body for generating acoustic signals in the formation, borehole and the body;

(c) preferentially attenuating signals passing through the body in a predetermined direction using an attenuator comprising a plurality of spaced-apart masses firmly and asymmetrically attached on an outside adjacent wall of the body, said masses being spaced apart a preselected distance to attenuate signals within a specified frequency range;

(d) using a receiver on a side of the attenuator opposite the transmitter for receiving signals through the formation and the attenuated signals through the body.

27. The method of claim 26 wherein said specified frequency range comprises 10 khz to 20 khz.

28. The method of claim 26 wherein said plurality of masses comprises a material selected from (i) steel rings, and, (ii) tungsten rings.

29. The method of claim 26 further comprising conveying the logging tool on a drilling tubular.

30. The method of claim 26 further comprising performing said acoustic investigations during drilling of the wellbore.